

The New Defense Facilities

By John D. Wilson

EVERY modern war has marked a period of significant industrial change. The War of 1812 was followed by the first comprehensive development of manufactures in this country. The growth of heavy industry, so necessary to an industrialized state, was hastened by the Civil War. And the technological advance and capital expansion induced by the World War carried the United States to a new peak of industrial efficiency.

The present conflict has similarly accelerated the tempo of industrial change. The needs of defense are bringing in their wake vast alterations in preexisting patterns—many of these will carry a heavy impress even in more normal times. Tomorrow's aircraft will be far superior to that of yesterday. The use of the products of the chemical industry will have become more than ever an integral part of our daily lives. And no one can say what necessity will mother in the way of new products and new methods, brought to fruition solely because conventional products and existing methods had to be sacrificed.

Today the country is undertaking the greatest expansion of industrial facilities in its history. Through August 31, Federal Government appropriations for new plant and equipment totaled 6.2 billion dollars, of which some 3.6 billion had been awarded in contracts. In addition, manufacturers themselves had financed a 1-billion-dollar plant expansion for defense. The huge magnitude of such an outlay may perhaps better be appreciated by comparison with the net book value of all manufacturing plant and equipment—estimated on a very rough basis to have been 22.5 billion dollars in 1940.¹

For the entire decade of the twenties, capital expenditure on all manufacturing facilities was 20 billion dollars. In the thirties it fell to 14 billion. In this year alone it will be close to 5 billion, with nearly four-fifths of this representing new defense outlay.

The New Armament Industry.

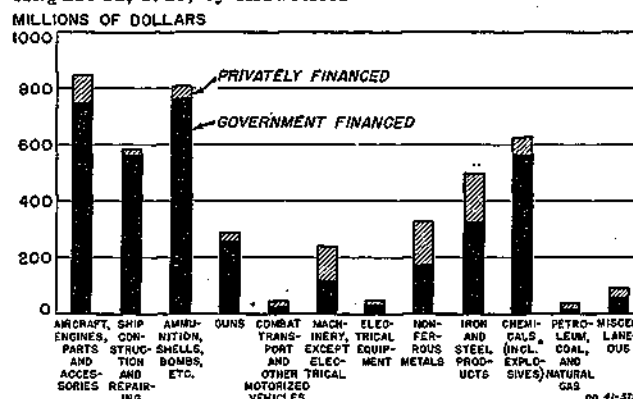
Great new industries are in the process of being created. Aircraft plant representing an outlay of 850 million dollars was under way by August 31, 800 million was being expended on ammunition facilities, and 585 million on shipbuilding plant. Again, the size of these industries—and they still are to be considerably expanded—is more easily comprehended when they are set alongside others that are better known.

¹ This estimate is based upon Bureau of Internal Revenue statements of the asset value of corporations reporting for tax purposes. Adjustments have been made to exclude land values and include the assets of unincorporated businesses. Of course, the figure reflects changes in book value made for any number of reasons permitted by the tax laws. During the thirties revaluations were downward, and book value today is less than replacement cost. As used above the estimate serves only as a very rough benchmark.

The automobile industry may be used as such a yardstick: at the end of 1938 the net value of its corporate assets was reported to the Bureau of Internal Revenue as being 1 billion dollars. Similarly, lumber corporations reported their capital assets at 1.1 billion dollars, textile and apparel corporations indicated their capital assets were 1.5 billions, and pulp and paper corporate plant was valued at 1 billion. In these latter instances, however, the book value is a less accurate measure of the actual productive facilities available, since downward revaluations have been very considerable.

Nevertheless, the total plant investment in the complex of finished armament industries is certain to be larger than that reported to the Bureau of Internal Revenue in 1939 by any single industrial corporate

Figure 6.—Value of Defense Contracts for Industrial Facilities Financed with Government and Private Funds Through August 31, 1941, by Industries



Source: Office of Production Management.

group, with the possible exception of iron and steel (3.5 billion dollars), and coal and petroleum products (4 billion dollars).

Large Expansion of Raw Material Processing Plant.

Processing plant for raw materials is also being vastly enlarged, a need created by several circumstances. The raw material components of the wartime pattern of output are radically different from those in peacetime. Moreover, the low level of output in the thirties relative to the labor resources available, held back the expansion of raw material facilities which might otherwise have occurred in that decade.

The heaviest defense investment on raw material plant is in chemicals, including explosives (627 million dollars), nonferrous metals (325 millions),² and iron and steel (500 millions).² Though further additions are to be made (particularly in the metals), the new investment represents a very sizable expansion in each in-

² Investment in metal plant includes some expenditure on mining facilities. The book value of metal manufacturing facilities reported by the Statistics of Income also includes some mining investment.

stance. At the beginning of 1939, net capital assets of corporations producing chemicals and allied products were reported at 1.5 billion dollars, iron and steel plant was valued at 3.5 billion, and nonferrous metals facilities at 550 million. Again, because of asset revaluations a comparison of the book value of capital assets with new capital expenditures does not give an accurate indication of the degree to which the ability to produce has been increased in these industries. Such a comparison merely offers a very rough picture of the magnitude of the expansion.

Moreover, each of these groups is itself a complex of industries, and within each group new lines are springing up which inevitably will create far-reaching technical changes in production methods, particularly in the post-war period. For example, on the basis of new price relationships, aluminum may in the future be substituted for copper in some uses, magnesium for aluminum in others, copper and other nonferrous metals for steel, and one type of steel alloy for another.

Machinery Expansion Sets Pace of Defense Advance.

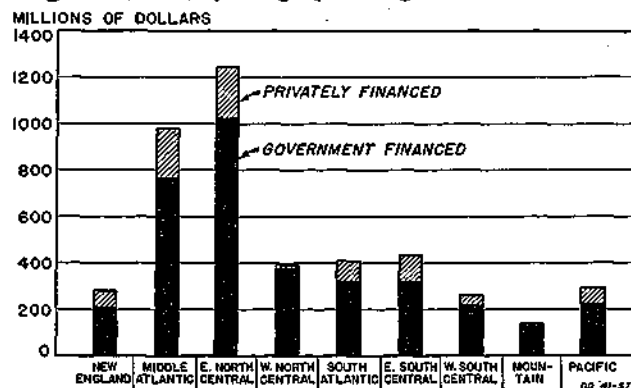
The fact that a complex of new industries is being created in the short period of 2 years has made necessary the rapid expansion of another intermediate line—the machinery industry. Tools are required to build tools, and for this reason machinery output governs the pace of the whole defense advance.

In 1939, the net capital assets of machinery corporations were valued at 1,170 million dollars, with the electrical machinery and equipment producers having additional assets equaling 418 million. The former producers are now undertaking a defense outlay of 240 million dollars, while electrical equipment facilities are being expanded at a 49-million-dollar cost. Here, too, a large variety of products is represented, but the bulk of the new plant is devoted to increasing output of a specialized sort—the heterogeneous group of machine tools.

The Geographical Distribution of New Defense Facilities

The process in which new industries are rising, old ones are being expanded, and others are being forcibly curtailed, is bringing with it some very important shifts in the relative industrialization of various areas. Again an alteration of this character is greatly hastened in wartime, and the new order automatically created can be more easily discerned.

Figure 7.—Value of Defense Contracts for Industrial Facilities Financed with Government and Private Funds Through August 31, 1941, by Geographic Regions



Source: Office of Production Management.

Even though further additions to the plant program are to be announced, the picture now is complete enough to reveal certain important trends. Those sections which in the past have been most heavily industrialized—New England, the East, and the Great Lakes regions—while still receiving more than three-fifths of the funds allocated for new defense facilities, have a smaller percentage of the aggregate new plant than they possessed of the old. On the other hand, States embraced by the grain belt (the West North Central States), the Rocky Mountain region, and the South are improving their relative industrial position even though the expenditure in these areas is much smaller.

Table 1.—Government and Privately Financed Industrial Facilities for Defense Through August 31, 1941¹

(Thousands of dollars)

Region	Grand total	Chemicals (including explosives)	Petroleum, coal, and natural gas	Iron and steel products	Ammunition, shells, bombs, etc.	Guns	Aircraft, engines, parts and accessories	Ship construction and repairing	Combat transportation and other motorized vehicles	Nonferrous metals	Machinery (except electrical)	Electrical equipment	Miscellaneous manufacturing
Total.....	4,577,818	626,540	36,716	498,142	806,022	285,143	848,368	555,198	45,079	325,060	240,310	49,125	86,935
Government-financed.....	3,635,839	561,773	14,334	325,279	704,311	259,167	749,316	502,782	28,982	172,074	116,582	30,336	54,901
Privately financed.....	941,979	64,867	22,382	172,863	41,211	25,976	99,052	22,416	21,097	152,986	123,728	18,789	32,034
New England.....	281,265	3,733		4,615	24,648	49,191	68,643	62,266	117	3,502	55,370	4,637	1,494
Middle Atlantic.....	979,361	12,505	8,015	252,064	22,788	81,786	140,015	230,865	10,287	69,022	71,118	17,229	55,026
East North Central.....	1,254,723	213,981	5,766	89,060	251,042	108,865	367,473	2,305	32,733	37,981	100,858	18,054	15,172
West North Central.....	392,609	48,514		548	248,101	17,943	64,091	28	1,201	18	2,980	321	901
South Atlantic.....	409,132	123,180	1,240	82,447	21,715	13,786	28,367	99,049	404	2,458	5,351	4,495	8,578
East South Central.....	436,322	174,771	2,607	44,884	89,507	11,116	3,957	18,067	42	88,239	210		601
West South Central.....	262,862	47,058	18,740	12,286	75,204	7	56,312	31,258		18,378		125	712
Mountain.....	139,643	1,077		7,092	71,492					65,862	18		84
Pacific.....	294,712	317	333	2,724	1,470	2,447	102,687	128,216		38,699	3,405	3,064	3,604
Undesignated.....	115,190	1,276		2,522			16,216	2,526	205				4
Noncontiguous.....	11,940	122						10,680					750

¹ Government-financed represent definite commitments (contract awards and letters of intent) of \$25,000 and over. Figures on privately financed facilities are estimates from approved applications for certificates of necessity.

Source: Bureau of Research and Statistics, Office of Production Management.

Table 1 offers a comparison of the regional allocation of funds for defense facilities with the geographical distribution of the value added by manufacturers in 1939 and the distribution of defense contracts (exclusive of those for facilities) awarded as of August 31.

In general, those considerations which have guided the location of new facilities in the past have been somewhat modified by the peculiar nature of the present expansion. Military strategy and the need for the utmost haste have in some instances dictated locations which under longer term conditions might prove less economical than others.

Nevertheless, such important factors as the location of raw materials, the availability of power, and the supply of labor (much less important now than even a decade ago because of increasing mobility) have all played a considerable and at times a decisive role in the geographical allocation of the new plant. Moreover, in the past the location of an industry in a particular region has quite commonly been an historical accident. Having started, it continued to grow, only shifting when the relative advantages of another region became more and more obvious. Likewise, many of today's new facilities are simply appendages of the old, the quickness with which such additions could be built proving the dominant consideration.

Largest Plant Expansion in Great Lakes Area.

The largest plant expansion, involving an aggregate expenditure of 1.3 billion dollars, is in the East North Central region, which includes the Detroit and Chicago areas, as well as the other territory bordering on the Great Lakes. This section produced 31.5 percent of the value added by manufacture in 1939, but it held only 19 percent of the defense-supply contracts issued through August. Plant outlay in the region is 28 percent of the total.

Table 2.—Percentage Distribution by Regions of Defense Contracts for Industrial Facilities, Value Added to Products by Manufacture, and Defense Contracts for Supplies

Region	Defense contracts for industrial facilities through Aug. 31, 1941	Value added by manufacture in 1939	Defense contracts for supplies through Aug. 31, 1941 ¹
United States.....	100.0	100.0	100.0
New England.....	6.1	9.8	12.0
Middle Atlantic.....	21.4	29.8	24.7
East North Central.....	27.5	31.5	13.7
West North Central.....	8.6	5.5	5.9
South Atlantic.....	8.9	9.0	8.2
East South Central.....	9.5	3.4	2.0
West South Central.....	5.7	3.4	4.1
Mountain.....	3.1	1.1	.7
Pacific.....	6.4	6.5	16.7
Undesignated.....	2.5	(²)
Noncontiguous.....	.3	7.0

¹ Major prime supply contracts of the War and Navy Departments. Awards having a value of less than \$50,000 are excluded.

² Distribution based on data for continental United States.

³ Less than ½ of 1 percent.

Source: Basic data from the Bureau of Research and Statistics, Office of Production Management, and the Bureau of the Census, Department of Commerce.

The facilities under construction in the area cover a wide variety of industries. The chemical industry, which already had approximately a fourth of its products (as measured by value added to manufacture) produced there in 1939, will be more heavily concentrated in this locale after a new defense plant is completed. About one-third of the outlay for defense chemical facilities (which include explosives) is being made in the Great Lakes region, particularly in Indiana.

From a raw-material standpoint (particularly by-products of the manufacture of coke and gas) the location is efficacious. However, to a large degree these plants are necessary to support the great new ammunition industry now rising in the interior of the country. Partly for strategic reasons about one-third of the new ammunition facilities are in the Great Lakes area, a much larger proportion than formerly.

For similar reasons, almost two-fifths of the new gun plants are in the region, though their manufacture in this section prior to the defense program was exceedingly small.

More than two-fifths of our machinery was produced in the Great Lakes area prior to defense and the allocation of new machinery plant to the region is about in the same proportion. Large producers in Michigan and Ohio are adding to their facilities, having the skills, including that of management, available for the purpose. Of course, much of the market for new machinery is also there.

A similar situation exists in respect to electrical equipment. The region's share of the new facilities remains about the same—around one-third—as its contribution to such products in 1939.

The outstanding new industry brought to the Great Lakes area is aircraft. Less than 4 percent of the value added in this industry was produced there in 1939. But 43 percent of the new facilities are located in the section. Two major factors are involved—the strategic location and the need for a speedy expansion of output. The latter revolves around the presence there of the automobile industry, which is the major source of facilities available for conversion. Automotive firms are heavily engaged in the manufacture of aircraft, particularly engines, airframes, and the various bomber parts. Both the automobile labor and the vast network of small-parts manufacturing facilities are to be utilized in this tremendous new industry.

Again, because of the automobile industry, about three-fourths of the new plant for combat and other motor vehicles are in the region. On the other hand, for obvious reasons new shipbuilding facilities are comparatively small to date.

In the expansion of metal facilities, however, a number of factors discussed in more detail below are influencing the relative position of established areas. Whereas in 1939 the Great Lakes regions produced better than two-fifths of the iron and steel and the nonferrous metal

output, the area will include only 18 and 12 percent, respectively, of the new plant for which arrangements have thus far been made.

The further steel expansion now planned may change the area's share of this basic raw material. However, the huge growth in the importance of aluminum and magnesium is inevitably shifting the nonferrous metal production to other regions because of raw material and power considerations.

Ships and Iron and Steel in the Middle Atlantic Region.

The Middle Atlantic region—New York, New Jersey, and Pennsylvania—has always been one of the heaviest industrialized areas, producing about 30 percent of the value added by manufacturing in 1939. It was awarded 21 percent of the new defense facilities at a cost of 979 million dollars, and about one-fourth of defense contracts let through August went to its industries.

Two basic defense industries were originally of exceptional importance in the area and will continue to be so—iron and steel and their products and shipbuilding. A third of the value added by manufacture in the important iron and steel industries was turned out in these States in 1939. But half the new facilities announced through August 31 are being located there. This may appear surprising, since in recent years, a shifting market and some alteration in transport and raw material conditions have produced a relative growth of the industry in the Midwest. A substantial part of the new plant is specially designed for a new market—armament, and Pennsylvania is centrally located for this market. But even more important is the character of the plant expansion. As already existing companies have thus far without exception undertaken the expansion, about 60 percent of it consists of so-called "scrambled facilities"; that is, a new blast furnace is placed in one particular plant, new beehive ovens at another, an extension of existing plate capacity is made at another, and so on. In only a few instances, for example, at Pittsburg, California, are whole new plants being constructed. It so happens that the "scrambling" has been possible on a larger scale in the Middle Atlantic region than elsewhere.

Data are not available for publication concerning the prewar distribution of shipbuilding activity. However, very important plants existed in the Middle Atlantic region and these contributed a substantial share of the industry's output. For the most part these plants are being enlarged, so that two-fifths of the new facilities are in the area, the largest proportion for any region.

Slightly less than a third of the new capacity for producing machinery is to be found in the Middle Atlantic States, though these turned out only something between a fourth and a fifth of the machinery product before the war. For the most part the equipment has been added to specialty shops in Pennsylvania. In

respect to electrical equipment, the comparative position of the area will remain unchanged—about two-fifths of the new plant is there.

A relatively small number of the new aircraft plants are being built in this section, but the facilities there at the start were not a substantial proportion of the whole. For obvious reasons an even smaller percentage of the facilities for turning out ammunition are being added to Middle Atlantic industry. In 1939, it produced two-fifths of the value added in that field.

Perhaps the most important shift of new facilities out of the Middle Atlantic region is in the expanding group of chemical industries. Only a very small percent of the chemical plant now under construction is there; whereas in 1939 more than a third of the chemical output emanated from the Middle Atlantic section. This was natural, for it was that area which served as the birthplace of a large group of chemical lines, partly because of the convenient raw material facilities.

Chemicals and Nonferrous Metals from the South.

The chemical industry, induced by labor and power considerations, has in recent years spread to the South, chiefly along the South Atlantic coast. Previous to defense, about a fourth of chemical output came from the South. Much of the new plant was constructed in the thirties. Today, the trek of the industry to the region is being accelerated under the defense program, with more than half of new plant being located throughout the whole Southern region. More than ever, the availability of power is not a little responsible for the movement. Particularly is this the case because of the great increase in the need for nitrates and phosphates. Whereas, the movement of the chemical industry from the East was chiefly along the South Atlantic; it now is moving inland to the East South Central States. From a market standpoint (the new ammunition industry), this is economical.

Power is also a reason for the growth of the important nonferrous metal industry in the South, though the availability of raw materials in the area is of basic importance too. Almost one-third of the new capacity is concentrated in the Tennessee Valley Authority area, while in 1939 less than 5 percent of the output came from there. The shift of nonferrous metal facilities to the South is, of course, a reflection of the increasing importance of aluminum and magnesium among the nonferrous metals group as a whole. The South is also faring relatively well to date insofar as its share of the new iron and steel plant is concerned, if West Virginia is included as part of the area. Expansion in the Alabama area thus far announced has been sizable, as might be expected because of both marketing and raw material considerations.

The South's share of the new finished armament industry being developed by the defense effort has been very small to date. Guns, aircraft, combat vehicles—

it is to produce little of these. However, it will include more than a fourth of the new shipbuilding facilities, scattered on both the Atlantic coast and the Gulf. In many cases these are entirely new plants and they may presage a shift of shipbuilding activity to the South in the postwar period. In addition more than a fifth of the new facilities for producing ammunition are to be located in this area.

South Makes Relative Gain Industrially.

Altogether close to a fourth of the expenditure on new facilities is being made throughout the whole South, including Maryland and Delaware as part of that district. This represents a considerable gain when compared with the approximately one-sixth of the aggregate value of manufactures which the South added in 1939. Because the section was behind most others industrially, it has only 15 percent of the defense contracts (other than for facilities) awarded through August.

Machinery and Guns in New England.

New England, devoid of basic raw materials but already highly industrialized, must watch most of the industrial expansion go to other regions. The section has almost 12 percent of the contracts for war material, and 6 percent of the expenditure on new facilities. The region contributed one-tenth of the aggregate value added to manufacture in 1939.

New England already had developed facilities for aircraft, guns, and ships, and these are being further expanded. However, the proportion of the total outlay on plant for these finished war goods which is being expended in New England is not large—one-sixth of the gun facilities, one-tenth of the ship facilities, one-twelfth of the new aircraft plant. Thus, it is apparent that this section will become relatively less important as a producer of these commodities despite the expansion of plant. Strategic considerations, as much as any other, would apparently make this necessary.

However, this is not true in the case of machinery, exclusive of electrical. More than a fifth of the new plant for this vital industry is being constructed in New England, though the section was responsible for only 14 percent of the machinery product in 1939. Again, the defense program called for much specialized machinery which had been produced by manufacturers of the region, and the necessary haste called for a complete and effective utilization of the managerial and labor skills available there.

Practically none of the important expansion in such raw-material facilities as the chemicals, iron and steel, and the nonferrous metals, is occurring in New England. For the metals, the lack of raw materials is the basic reason.

Ammunition Plants in the Grain Belt.

The Middle-Western grain belt from Minnesota through Missouri and Nebraska is receiving about 9 percent of the new plant outlay. Through August,

however, this section held only 6 percent of defense contracts (exclusive of plant), which was approximately the contribution made by its industry to the value of manufacturing in 1939. Thus, this area is gaining in industrialization relative to others.

The largest expenditure on new facilities in the grain belt is for the production of ammunition, including shells and bombs. Almost a third of the new plant for this purpose is located there. While 8 percent of the new chemical facilities are being built in the grain belt, the area will largely be serviced with chemicals from the Great Lakes and East South Central sections. Aside from strategical considerations, this is a new industry which can use much labor not possessed of particular industrial skill. The area has not experienced an increased demand for its products in all parts—the wheat-growing sections, for example, have suffered a decline in demand. For this reason, labor is likely to be available for new industrial enterprises.

The prewar aircraft industry had a few units in the grain belt—chiefly in Kansas. These are being expanded so that the section is to contain 8 percent of the new facilities. In the main, the plants turn out airframes and are assembly centers.

The chief limiting factor to the industrialization of the grain belt, of course, is its great deficiency in most metallic raw materials.

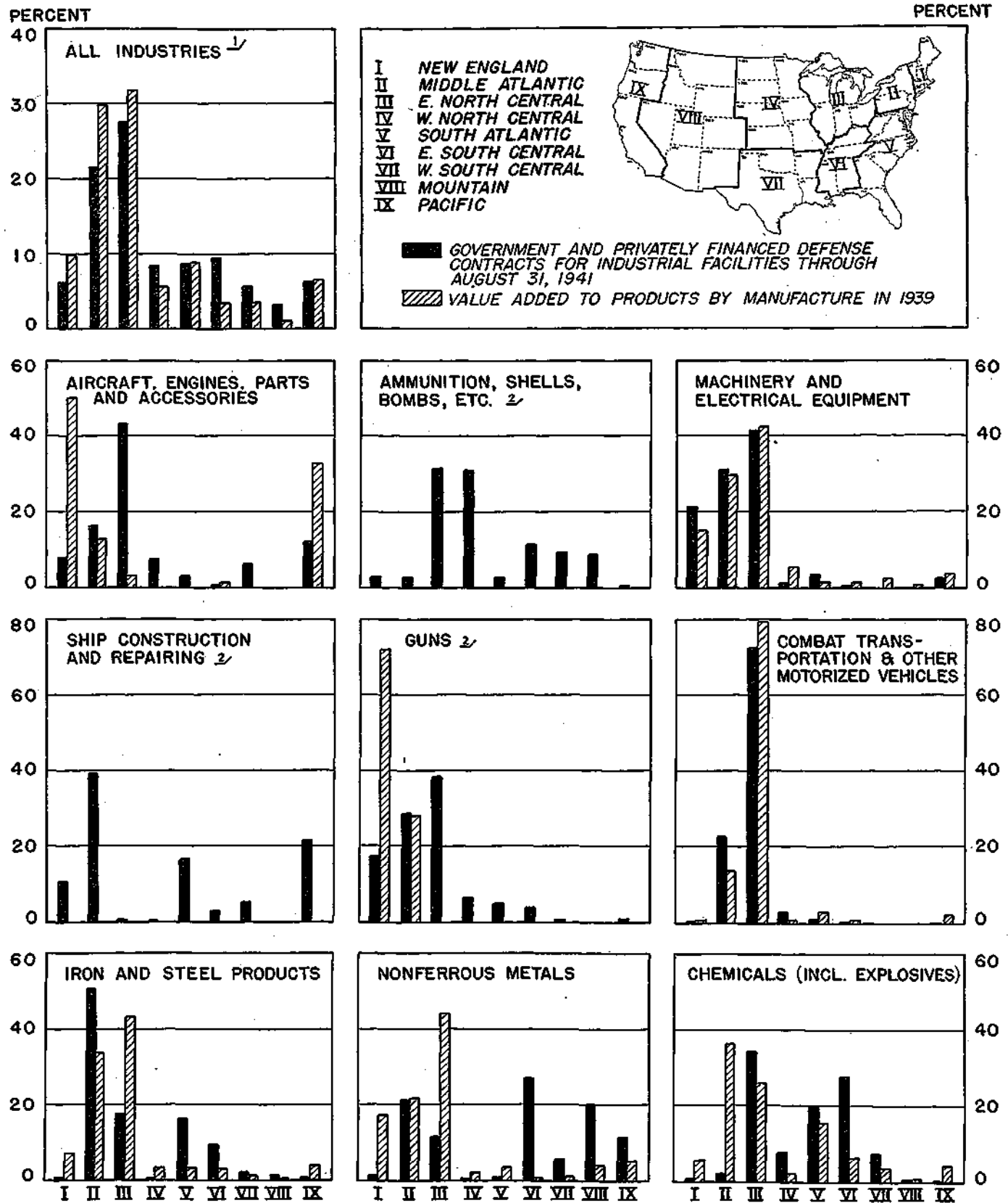
Aircraft and Shipbuilding on the Pacific Coast.

Even before the start of the defense program the Pacific coast region contained important industrial facilities useful for military purposes. In 1939, about a third of the aircraft, a sixth of the shipbuilding, and a good part of the ammunition output were produced in the region. These facilities were further expanded, and the Pacific coast had received about 17 percent of the defense contracts through August. The expenditure on new defense facilities is 6 percent of the national outlay, about the equivalent of the value the region added to all manufactures in 1939.

Like New England, the Pacific coast is losing some of its relative importance in the production of aircraft to the Great Lakes area. Only 12 percent of the new facilities are being added in the region. This is also true in the case of ammunition, as practically no new plants producing this commodity are being built on the Western coast. However, shipbuilding is expanding in importance, with the coast receiving more than a fifth of the total outlay for this purpose. Strategical factors have undoubtedly played some part in all of these shifts. But the mineral resources of the coast are less abundant than in other regions, and this places some curb on more extensive industrialization.

In this respect, however, the Pacific coast is somewhat better off than New England. Few new petroleum facilities are being built as the output of that vital mineral is adequate for the Pacific region. Steel ca-

Figure 8.—Percentage Distribution by Regions of Government and Privately Financed Defense Contracts for Industrial Facilities Through August 31, 1941, and of the Value Added to Products by Manufacture in 1939



^{1/} Covers all manufacturing industries in the United States.

^{2/} Value added to product by manufacture is not shown for shipbuilding and ammunition and is partly omitted for guns because operations of individual firms would be closed.

Source: Government and privately financed defense contracts for industrial facilities, Office of Production Management; value added to products by manufacture, U. S. Department of Commerce.

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capacity is being expanded; and while the projected increase is not great in absolute terms, the region will have a heavier output relative to other sections than it possessed before.

But the most significant raw material development is the building of the vital aluminum and magnesium plants in the Pacific Northwest, these having a cost equal to almost one-fifth of the aggregate outlay on nonferrous metal facilities. Both power and raw materials were instrumental in directing the new investment to the region.

Very Few Plants in Mountain States.

The sparsely populated Mountain States produced only 1 percent of the value added by manufacture in 1939. This will be enlarged a bit by the defense program, for 3 percent of the defense plant outlay is being made in the region, though slightly less than 1 percent of the defense contracts had flowed there as of August 31. New ammunition plants are the most important type being located in the Rocky Mountain region. However, a heavy expenditure on magnesium plant in Nevada also helps to boost the outlay of the region substantially. But in the main, labor, raw material, and marketing problems all preclude extensive growth under the defense program of other industries in the mountain section.

Financing and Ownership of the New Facilities

The peculiar nature of the defense demand and the speed with which the construction of new facilities

Table 3.—Government Financed Defense Industrial Facilities Through August 31, 1941¹

[Amounts in thousands of dollars]

Type of product	Total		Financed by Army, Navy, and Maritime Commission ²		Financed by Defense Plant Corporation ³	
	Number of plants ⁴	Amount	Number of plants ⁴	Amount	Number of plants ⁴	Amount
Grand total.....	516	3,635,539	331	2,429,983	229	1,205,555
Chemicals (including explosives).....	28	561,673	21	516,609	7	45,064
Petroleum, coal, and natural gas.....	2	14,334	1	12,517	1	1,817
Iron and steel products.....	48	325,279	30	125,574	18	199,705
Ammunition, shells, bombs, etc.....	76	764,811	65	712,981	12	51,831
Guns.....	62	259,167	54	218,869	10	40,298
Aircraft, engines, parts and accessories.....	129	749,316	39	220,447	100	528,869
Ship construction and repairing.....	60	562,782	55	530,556	14	32,227
Combat transportation and other motorized vehicles.....	6	23,982	2	20,172	4	3,810
Nonferrous metals.....	20	172,674	5	1,070	18	171,604
Machinery (except electrical).....	78	116,582	44	34,182	34	82,400
Electrical equipment.....	22	30,336	9	6,403	15	23,932
Miscellaneous manufacturing.....	18	54,901	14	30,541	6	24,360

¹ Government facilities represent definite commitments (contract awards and letters of intent) of \$25,000 and over.

² Includes emergency plant facilities of Army and Navy which totaled \$256,150,000 through Aug. 31, 1941.

³ Includes projects sponsored by Reconstruction Finance Corporation, which totaled \$46,212,000 through Aug. 31, 1941.

⁴ Number of plants by financing agencies or by type of product will not add to the total, because a plant may be financed by more than one agency, or produce more than one type of product.

Source: Bureau of Research and Statistics, Office of Production Management.

had to be undertaken has required the development of unusual methods of financing on a scale not heretofore known in this country. As of August 31, the Government itself had furnished 3.6 billion dollars for the construction of new plant, or four-fifths of the aggregate commitments and contracts made to that date. Funds furnished from private sources totaled 942 millions. These latter plants are privately owned, but as they are for defense purposes their owners may, under certain circumstances, amortize the plants for tax purposes over a period of 5 years.

Government outlay is provided in several different ways. The Army and Navy may construct the plant, retaining title to it. Sometimes these Services manage such plant, at other times they delegate the management (including the supervision of the construction) to private industry under a management-fee contract. Altogether, about three-fifths of the Government-financed facilities have been provided by the Army and Navy through these methods.

The Army and Navy have also been able to finance plants through the Emergency Plant Corporation. Under this method, the company building the plant arranges the financing as it wishes, but it is reimbursed by the Army or Navy in 60 equal monthly installments. The company retains title to the plant pending completion of payments, at which time title passes to the Government. However, if the company wishes, it may exercise an option to purchase, either at a negotiated price or at cost less depreciation. This method of financing has proved less generally acceptable to business than others, and Emergency Plant facilities totaled only 256 million dollars through August 31.

More important in those cases where facilities may possibly have a future commercial use is the Defense Plant Corporation, a subsidiary of the Reconstruction Finance Corporation. This organization provides funds to private manufacturers who construct the plants themselves. But the Defense Plant Corporation takes title in its own name and leases the facilities to the manufacturers for a fixed term, subject to renewal and option to purchase. If the contractor wishes to exercise his option at the end of the stated period, the price may be negotiated or is set at the original value less depreciation.

The Defense Plant Corporation has been utilized to a very considerable extent, both where facilities may have a future commercial use and in instances where it is clear they will not have such a use. Altogether, the corporation holds title to about a third of the Government-financed facilities.

In the early days of the defense program the Reconstruction Finance Corporation made a number of outright loans to producers for the construction of facilities. This, however, was a stop-gap procedure, necessary only until improved arrangements could be provided. The 46-million-dollar total of such

loans is small, being little more than 1 percent of the public financing.

Government Ownership of Finished Armament Facilities.

The greatest risk of future return on invested capital is obviously attached to the finished armament industries. Moreover, strong social reasons for public ownership of armament-making exist. Hence, it is not surprising to find the heaviest public participation in such lines as ammunition (95 percent Government-financed), guns (91 percent Government-financed), shipbuilding (96 percent), and aircraft (88 percent). Only one-half of the combat and motorized vehicle facilities were publicly financed through August 31, but this program is still largely in the process of organization.

The ammunition facilities for the most part are to be owned outright by the Army and Navy. These organizations have furnished funds for 93 percent of the new public plants. The Defense Plant Corporation owns most of the remaining facilities.

A similar pattern is prevalent in the gun industry, with the Army and Navy expending 84 percent of the Government outlay. Likewise the Navy and Maritime Commission have furnished the funds and hold title to over four-fifths of the shipbuilding plants. Their outlay has included 4 percent of the public expenditure.

Because of the very considerable postwar commercial possibilities in the aircraft industry, a somewhat different situation exists there. The Army and Navy have financed less than one-third of the new public plants, and almost three-fourths of these are to be paid for through the Emergency Plant Corporation. The Defense Plant Corporation holds title to 91 aircraft plants valued at more than one-half billion dollars. Thus, the management of this vast new industry holds option to purchase the new facilities rising throughout the country.

Heavy Private Investment in Machinery and Nonferrous Metals.

The machinery industry has relied less on public than on private sources for capital funds. A number of plants producing specialized machinery have been enlarged, and problems of ownership made these more easily financed from private funds. Moreover, the commercial possibilities in the immediate postwar period are apt to be more favorable for machinery output than for a number of the other finished commodities. The bulk of the public outlay on machinery facilities has been expended through the Defense Plant Corporation, with most of the remaining financing arranged through the Emergency Plant Corporation.

Among the raw material processing group almost half the nonferrous metal facilities are financed from private sources. Both aluminum and magnesium, the metals undergoing the largest expansion, have a rapidly

growing civilian demand, and this decreases the longer term risk on the investment. Of the plants publicly financed, Defense Plant Corporation is providing almost four-fifths of the funds, less than 10 percent is being supplied by the Army and Navy, and this through the Emergency Plant Corporation, and the Reconstruction Finance Corporation has provided funds for the remainder; so here, too, the management holds options for eventual purchase.

As the post-war pattern of demand may well require less steel than is needed at present, iron and steel producers are relying heavily upon public assistance in adding to their facilities. As of August 31, almost two-thirds of the new plant and equipment had been financed by Government agencies. Some of these facilities are of a specialized character, necessary for various military and naval uses; hence the Army and Navy have furnished about a third of the public funds. Most of the remainder has been financed by the Defense Plant Corporation. Again, the "scrambled" nature of a good part of the new facilities—appendages added here and there to already existing plant—has raised a number of ownership problems.

Outright Government ownership has been more prevalent for the chemicals than for any other raw material. Nine-tenths of the new facilities are publicly financed. Since they are required for the manufacture of ammunition and are to turn out large amounts of explosives, 90 percent of the capital outlay has been made by the Army and Navy.

New Patterns of Industry

The details set forth above reveal two broad and significant trends. First, the geographical concentration of industry is being decreased. More than ever, industry is a Nation-wide affair. And second, the structure of industry is being altered in a most important manner. On balance, the raw material and intermediate stages of output are so changed as to support a relatively larger output of durable goods, as compared with the nondurables, than was the case before the war.

Each of these changes has important implications, both for the near-term and the post-war periods. Shifts in industry are not made without creating the necessity for adjustments in other sectors of the economy. However, inasmuch as information on the location of new facilities is more complete today than ever before, the nature and magnitude of these adjustments may be anticipated more accurately by the business community and the Government.

For example, a change in the relative industrialization of different communities makes some migration of labor imperative. At present the movement of labor between industrial centers and from farm to

(Continued on p. 22)

The New Defense Facilities

(Continued from page 17)

industrial community is on a substantial scale. The data on the location of new facilities indicate clearly that this movement must be continued, and in a limited sense it reveals the direction of the migration and its magnitude.

Such population shifts have profound effects on all sectors of the business community. Utilities, housing, and marketing facilities, as well as other services, are expanded in one region, and may be forced to contract in others. Moreover, the location of consumer goods manufacturing is in part related to the market and may shift with it, though inability to construct new plant and equipment will curtail nonessential changes of this character in the defense period.

Thus, a reasonably accurate appraisal of the distribution of our plant and labor resources can be made as the defense program progresses. The picture of the post-war pattern of demand is obviously not clear at

present. However, the factors which are relevant to the determination of this pattern are known, and include such matters as the size and age distribution of consumer durable stocks (including housing); the amount of accumulated maintenance and repair; the need for capital expansion in new and old industries; the effective demand for our products on the part of foreign peoples; and the schedules of consumer preferences, both at present and in the past.

Data in respect to all of these factors either are in existence or can be developed to a usable extent. Once such data are available and have been pieced together, the broad outlines of the post-war demand pattern should be apparent. When these are related to the probable character and distribution of capital plant, labor supply, and other resources, some light will have been shed on the post-war economic picture. In this sense, the present period, with its wealth of information, offers both the business community and the government a unique opportunity for furthering their understanding of the problems that lie ahead.

NEW OR REVISED SERIES

Table 30.—RAYON FILAMENT YARN, WHOLESALE PRICE, VISCOSE, 150 DENIER, FIRST QUALITY¹

[Dollars per pound]

Month	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927
January.....	1.850	1.850	2.000	3.000	3.550	4.250	4.500	5.500	2.550	2.800	2.800	2.800	2.050	2.050	1.450
February.....	1.850	1.850	2.000	3.000	3.550	4.250	4.500	6.000	2.550	2.800	2.800	2.050	2.050	2.050	1.450
March.....	1.850	1.850	2.000	3.000	3.550	4.250	4.500	6.000	2.550	2.800	2.800	2.050	2.050	2.050	1.475
April.....	1.850	1.902	2.000	3.000	3.550	4.250	4.500	6.000	2.631	2.800	2.800	2.050	2.050	2.050	1.500
May.....	1.850	2.000	2.000	3.000	3.800	4.250	4.500	5.200	2.700	2.800	2.800	2.050	2.050	2.050	1.500
June.....	1.850	2.000	2.000	3.000	3.800	4.500	4.500	5.000	2.700	2.800	2.800	2.050	2.050	2.050	1.500
July.....	1.850	2.000	2.000	3.000	3.800	4.500	4.500	5.000	2.700	2.800	2.800	2.050	2.050	1.650	1.500
August.....	1.850	2.000	2.000	3.000	4.000	4.500	4.500	5.000	2.700	2.800	2.800	2.050	2.050	1.650	1.500
September.....	1.850	2.000	2.000	3.000	4.000	4.500	4.700	4.000	2.800	2.800	2.800	2.050	2.050	1.650	1.500
October.....	1.850	2.000	2.000	3.000	4.250	4.500	5.300	2.550	2.800	2.800	2.800	2.050	2.050	1.650	1.500
November.....	1.850	2.000	2.240	3.500	4.250	4.500	5.500	2.550	2.800	2.800	2.800	2.050	2.050	1.450	1.500
December.....	1.850	2.000	2.750	3.550	4.250	4.500	5.500	2.550	2.800	2.800	2.800	2.050	2.050	1.450	1.500
Monthly average.....	1.850	1.954	2.083	3.113	3.803	4.396	4.767	4.613	2.690	2.800	2.800	2.113	2.050	1.517	1.490
	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	
January.....	1.500	1.500	1.150	.796	.750	.900	.650	.600	.570	.600	.598	.510	.530	.530	
February.....	1.500	1.465	1.150	.750	.750	.900	.650	.600	.570	.600	.540	.510	.530	.530	
March.....	1.500	1.300	1.150	.750	.750	.900	.650	.600	.570	.600	.540	.510	.530	.530	
April.....	1.500	1.300	1.150	.750	.750	.900	.650	.600	.570	.623	.540	.510	.530	.530	
May.....	1.500	1.300	1.150	.750	.730	.550	.600	.550	.570	.630	.520	.510	.530	.530	
June.....	1.500	1.234	1.150	.750	.600	.575	.550	.550	.578	.630	.490	.510	.530	.530	
July.....	1.500	1.150	1.081	.750	.550	.600	.550	.550	.570	.630	.490	.510	.530	.530	
August.....	1.500	1.150	.950	.750	.550	.650	.550	.505	.570	.630	.510	.510	.530	.530	
September.....	1.500	1.150	.950	.750	.600	.650	.550	.570	.570	.630	.510	.520	.530	.530	
October.....	1.500	1.150	.950	.750	.600	.650	.550	.570	.570	.630	.510	.530	.530	.530	
November.....	1.500	1.150	.950	.750	.600	.650	.550	.570	.570	.630	.510	.530	.530	.530	
December.....	1.500	1.150	.950	.750	.600	.650	.550	.570	.570	.630	.510	.530	.530	.530	
Monthly average.....	1.500	1.250	1.061	.754	.654	.607	.592	.573	.571	.622	.522	.516	.530	.530	

¹ New series. This series compiled by the Bureau of Labor Statistics of the Department of Labor replaces the rayon price shown in the 1940 Supplement and in monthly issues of the Survey through February 1941. The new series is considered more representative of the development of finer filament yarns. The complete description of these data is as follows: Viscose filament yarn, 150 denier, first quality, minimum filament, bleached, skeins, per pound, f. o. b. producer's plant, minimum freight allowed to destination. The minimum filament at present is a 40 filament yarn. For earlier years the minimum represented a lower number of filaments. Data are computed from Tuesday prices reported by a trade organization.